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Research & Development

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EDITORIAL

9 **1986: A door opens.**

DEPARTMENTS

15 **Innovative Notebook**
21 **Product Development**
25 **R&D Business**
29 **Research Trendletter**
33 **R/D News in Brief**
87 **Laboratory Safety**
89 **New Products**
97 **R&D Product Center**
101 **Literature**
108 **Opinion Poll Results**
110 **Opinion Poll Questionnaire**
113 **Letters**
114 **Advertisers Index**
117 **Reader service card**

ABOUT THE COVER

The newest digital oscilloscopes cost less than earlier storage scopes, but they supply more-useful information. Special trigger modes simplify capture of events outside defined limits. Related article begins on p 64.

NEWS

39 **Technology export:** Summit clouds U.S. export policy; British suggest "forums" for Eureka program; West agrees to speed tech exports to China; quake lab tests models realistically; massive robot puts flesh on robotic theories

41 **Science policy:** Keyworth resigns from White House post on upbeat note

44 **R&D funding:** GAO report compares funding methods of five Western nations; Japanese funding more long-term research; French move to bolster research establishment

48 **Robotics:** Research on mechanical hands relies on innovative software

49 **Physics:** Magnet design brings breath of reality to SSC project

52 **Milestones:** Mosbacher caps a 36-year career with AVEM award

52 **Technology & Law:** Advances in electronics threaten Americans' right to privacy

55 **Aviation:** Researchers work to reduce helicopter noise

56 **Awards:** Lab of Year deadline nears; *IR 100* Program rewards hard work

ARTICLES

60 **$119 billion for R&D in the U.S. in 1986:** C.J. Mosbacher, consultant, *R&D*; total funding increases $10 billion, leads general economy.

64 **Use a DSO to get more and better data:** Marc Brenner and Robert A. Oblack, Tektronix Inc.; newest scopes cost less but give more-useful data than earlier versions.

70 **Elastomer protects optical fibers:** William E. Dennis and Donald W. Burke, Dow Corning Corp.; coating relieves fiber stress.

74 **LAN connects scattered research facilities:** J. Poplawski and M. Kuntz, Grumman Data Systems; supercomputer speeds tasks.

79 **Collaboration results in new way to control reactor atmospheres:** Tom Nelson, Linde Div., Union Carbide Corp.; reactor gas analysis for purity of IC-processing gases.

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CIRCLE 101 ON INQUIRY CARD

$119 billion for R&D in the United States in 1986

An increase of almost $10 billion in total funding will keep research and development ahead of the general economy in growth, even though the growth rate is slower than before.

C. J. Mosbacher
Consultant, *R&D* magazine

THIS YEAR brings an end to a succession of double-digit increases in R&D funding. At least that is what our forecast results indicate, with an overall increase of slightly less than 9% from 1985 funding. To be exact, the increase is 8.97% from $109.2 billion to $119.0 billion.

But with inflation forecast at 4.5%, an estimate based on the consensus of economists' predictions at the end of November, that's enough for us to predict with some confidence that the R&D field once again will exhibit real growth this year. And, with real growth in the gross national product forecast, on the same basis, as 3.5% for 1986, the proportion of gross national product spent on R&D will increase from the estimated 2.8% share in 1985.

Included in the total are $58.0 billion from the industrial sector, $57.2 billion in Federal government funding, and $3.8 billion from other sources that include the academic community and other nonprofit organizations. In the performance of R&D, industry will spend $88.1 billion, the Federal government $14.1 billion, and the academic and nonprofit sector $16.8 billion.

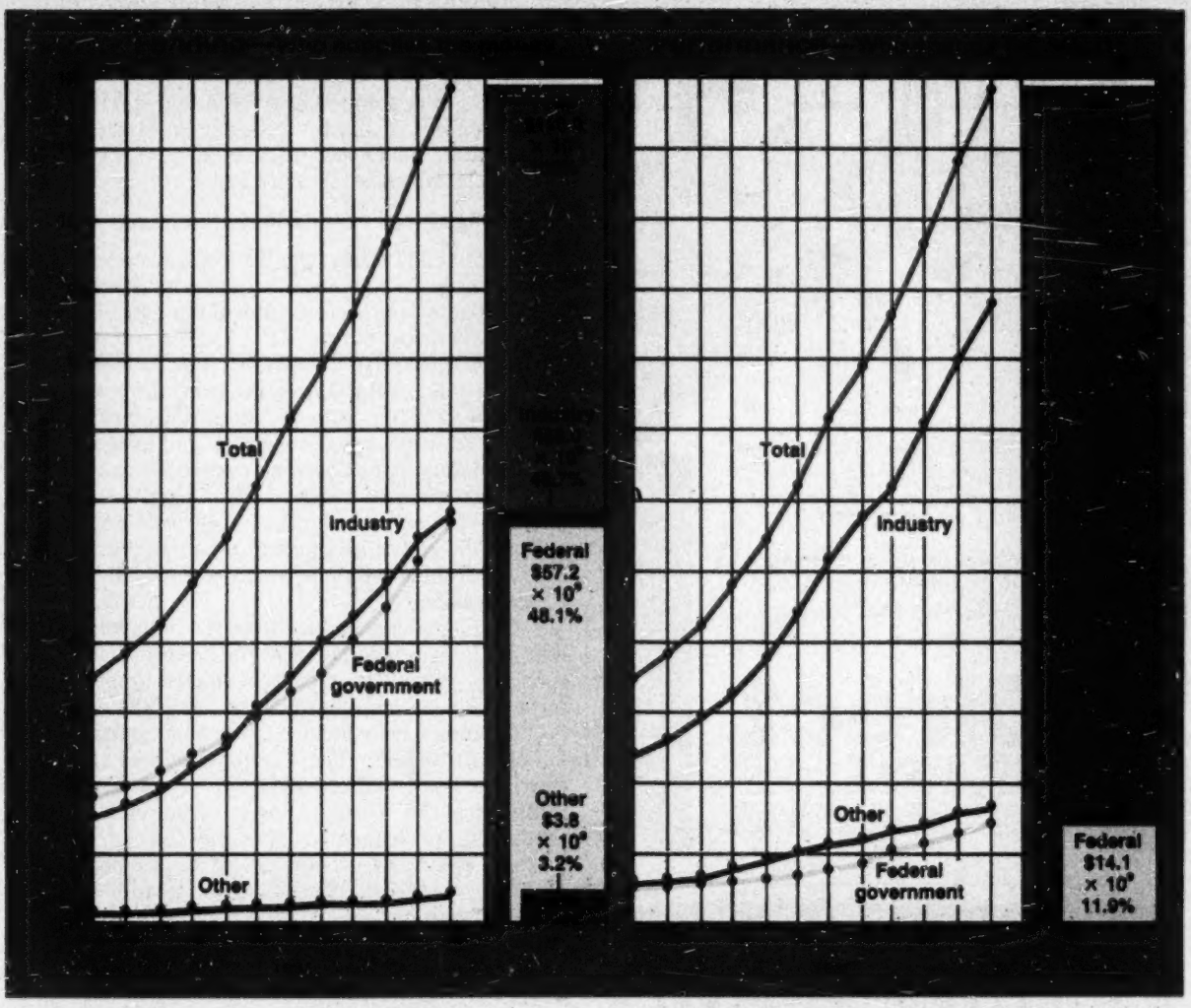
This means that industry will provide 48.7% of the total funding and will spend 74.0%. The Federal government will provide 48.1% and will spend in its own facilities 11.9%. The academic and nonprofit groups will provide 3.2% but will spend 14.1% during calendar 1986.

As in previous years, our first step in preparing this forecast was to revise our 1985 forecast in the light of later government data and developments during the year. We tracked changes in Federal funding as appropriated funds were obligated to specific projects. For the industrial sector, we scanned financial reports and other documents, monitored changes in plans as reported in the media, and spoke personally with executives of a number of companies. We did the same with leaders of academic and other nonprofit organizations.

The information thus garnered also was invaluable in formulating our 1986 forecast.

For funding for 1985, the R&D forecast was $55.0 billion from industry, $51.5 billion from the Federal government, and $3.5 billion from other sources. The forecast for performance was $81.2 billion by industry, $12.4 billion by the Federal government in its own facilities, and $16.4 billion by other sectors, for a total of $110.0 billion.

The National Science Foundation, in its "Science Resources Studies Highlights," NSF 85-304, dated January 31, 1985, projected funding as $54.0 billion from industry, $51.5 billion from the Federal government, and $3.7 billion from other sources. Corresponding figures for performance were $80.0 billion, $13.4 billion,



and $15.8 billion, for a total of $109.2 billion projected for 1985 R&D.

For funding, NSF's projection agreed with our forecast for the Federal government. However, our later data indicate that industry funding should be $54.2 billion and funding by the academic and other nonprofit sectors should be $3.5 billion.

For performance, we agree with NSF's $80.0 billion for industry, in line with the significant adjustment for industry funding during the year. However, later data indicate that NSF overestimated, albeit slightly, performance in Federal laboratories and underestimated the growth of academic and nonprofit research. Our revised performance figures are $13.2 billion for the Federal government and $16.0 billion in the academic and nonprofit sector.

Thus in 1985, industry provided 49.6% of R&D funds, the Federal government 47.2%, and other sources 3.2%. Corresponding numbers for performance are 73.3%, 12.1%, and 14.7%.

These revised 1985 data were used to calculate the increases or decreases in the remainder of this forecast.

Industry funding increases more slowly

From 1984 to 1985, industry increased its R&D funding by 11.5%. Early in 1985, all indications were that this rate of increase would continue. Then slumps in the computer, semiconductor, and other areas occurred. A few firms, mostly those already known for countercyclical adjustments to R&D funding, increased support, but the majority of firms adjusted their plans in line with reduced revenues. Projections of lower growth in gross national product became common.

Late in 1985, the McGraw-Hill Economics unit of McGraw Hill Inc. reported that their annual survey of capital spending indicated a 1% cut in industry plans for 1986. For durable-goods makers, however, this study projected an increase of 6.8% for aerospace capital spending and an increase of 7.8% for instruments.

Copeland Economics Group Inc. confirmed lower spending plans by industry in its report to the Laboratory Apparatus Section of the Scientific Apparatus Makers Assn. during November. Copeland projected a 1.0% increase from 1985 to 1986, following a 5.6% increase from 1984 to 1985. Comparable Copeland data are a 14.7% increase in the governmental sector and a 1.7% decrease in the educational sector.

It's important to note at this point that R&D funding does not track capital spending. If a relationship exists at all, R&D leads capital spending, but that is an intuitive statement. Studies to quantify the time element have failed, leading only to generalities.

But general business conditions do affect both

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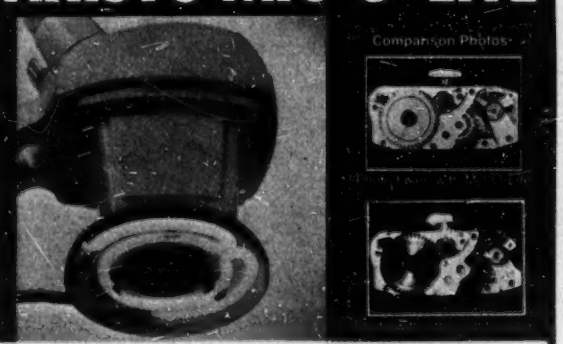

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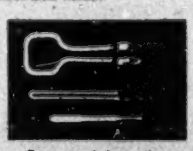

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capital and R&D funding. Last-minute checks with industry leaders indicated that 1986 funds would increase slightly over 7% from 1985 levels.

Our forecast for industry funding is $58 billion. With transfers of funds, primarily from the Federal government, we expect industry to perform 74% of 1986 R&D, which is $88.1 billion.

Double-digit increase again for Federal funds

At the end of July, the National Science Foundation reported in NSF 85-322 that Federal R&D funds were budgeted to increase 15% in the fiscal 1986 budget. Nearly three fourths of the $58.3 billion total supported defense-related activities. That was a 23% increase in defense R&D from the previous year.

Budgets differ from appropriations by Congress, which differ from actual obligation and expenditure of Federal funds. It has become customary for the Congress to act on many appropriations after the beginning of the fiscal year, which makes forecasting more difficult. By the end of November, adequate decisions had been made to allow some precision in predicting 1986 Federal funds.

One significant change from the budget is a $1 billion cut in Strategic Defense Initiative ("Star Wars") spending. In general, Congress shaved funds from almost all R&D items in the budget for FY86.

Calendar 1986 includes the first quarter of the Federal fiscal 1987. The Gramm-Rudman legislation restricts possible deficits and could impact R&D funds in the fiscal 1987 budget. For example, indications already point to curtailment of energy R&D.

All this leads us not to expect a repeat of the 14.2% increase from 1984 to 1985. Our studies indicate an increase of just over 11% in Federal funding.

Our forecast for Federal calendar 1986 funding is $57.2 billion. We expect $14.1 billion to be spent on R&D in the government's own facilities. That's an increase of 6.8% from 1985.

Universities and nonprofits gain

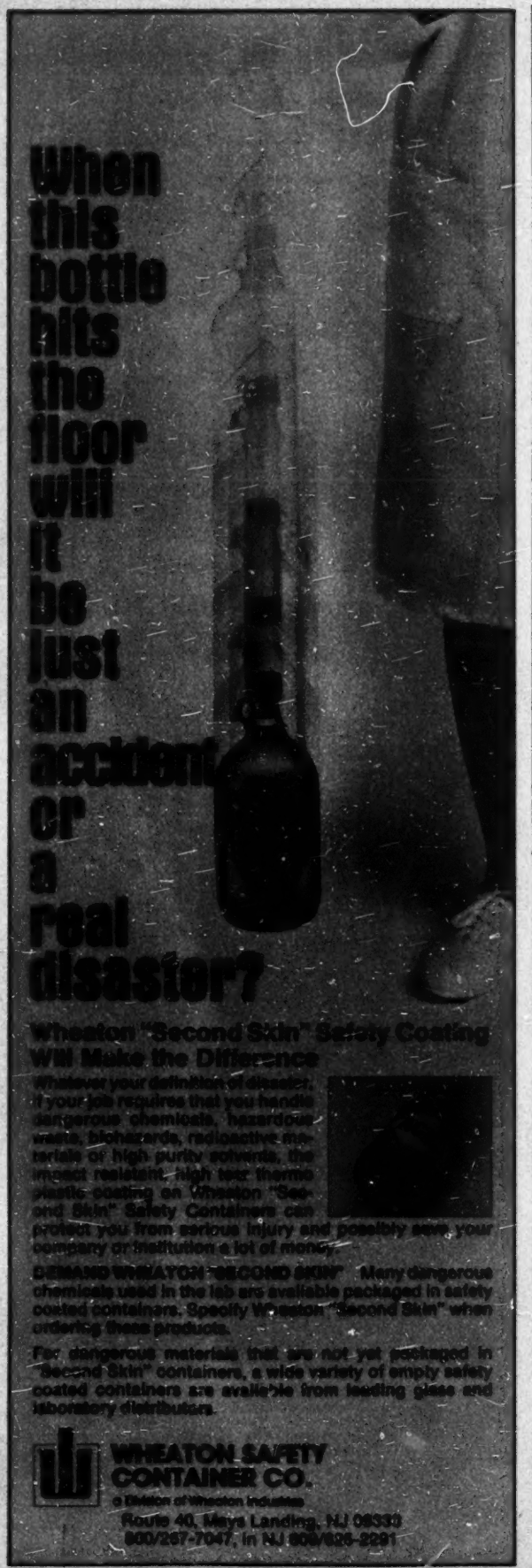
The academic and nonprofit sector had the smallest gain of the three sectors from 1984 to 1985 in funding, 9.4%. The increase from 1985 to 1986 is just slightly less according to our studies, 8.6%. Our forecast is that this sector will provide $3.8 billion.

Reluctance to accept Dept. of Defense funding of academic R&D is declining. Nonprofit R&D centers are becoming vital to industry in such areas as semiconductor processing and computer development.

Counterbalancing these developments is the decreasing rate of increase in funds available from the Federal government and industry. Our forecast, therefore, is that performance of R&D in this sector will rise 3.8% to $16.8 billion.

Performance of R&D in the academic and nonprofit sector thus becomes a slightly smaller part of the total, falling from 14.7% in 1985 to 14.1%. In the Federal sector, performance goes from 12.1% to 11.9% of the total. Conversely, the industrial sector rises slightly, from 73.3% to 74% of the total.

These changes are insignificant compared to the limits of accuracy of this forecast. All these data show is that there has been essentially no change in the patterns of distribution of R&D funds. R&D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OPINION POLL RESULTS

Strong reader interest in China as market, workplace

READERS of *Research & Development* respond favorably to the efforts of mainland China to establish technology and trade contacts with Western nations.

In response to a recent Opinion Poll Questionnaire, more than 50% say that they are working on a product which could be marketed in China now. Fully 85% believe that it would be wise for Western firms to try to develop markets in China. And more than half of the respondents said that they would accept a transfer to work a year or more in China.

The same questions were asked of our readers in a 1979 survey and, with two exceptions, the answers were within three percentage points of being the same in both surveys. In one change, 36% of respondents now favor substantial capital commitments in China, compared to 28% in 1979. In the other, 36% report having had representatives of the PRC as visitors or trainees at their firms recently. The figure was 18% in 1979.

Complete results of the recent survey follow:

1. *Does your principal work involve a product which could be marketed in China?*
   a. Now ..... 52% c. Never (or no) 17%
   b. Only later ..... 16 d. Don't know 14

2. *If your answer to Question 1 was a or b, would the market for your product be domestic (as opposed to sales to industry)?*
   a. Yes ..... 32% b. No 68%

3. *Do you think it would be wise for Western firms to try to develop markets in China?*
   a. Yes ... 85% b. No .... 7% c. No opinion 8%

4. *Do you think it would be wise for Western firms to establish substantial capital commitments in China?*
   a. Yes ... 36% b. No ... 42% c. No opinion ... 22%

5. *Have you had representatives of the People's Republic of China as visitors or trainees at your firm recently?*
   a. Yes ... 36% b. No ... 51% c. Don't know ... 13%

6. *Have you ever visited or worked in China?*
   a. No ..... 91% c. A few weeks 2%
   b. A few days ..... 4 d. Longer 1

7. *Do you speak any Chinese dialect?*
   a. Yes ..... 4% b. No 96%

8. *Would you accept a transfer to work a year or more in China?*
   a. Yes ..... 51% b. No 49%

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